Microsoft

.net developer training

Create XML Web Services and Applications with Visual Studio .NET

Using Data Access in .NET Applications

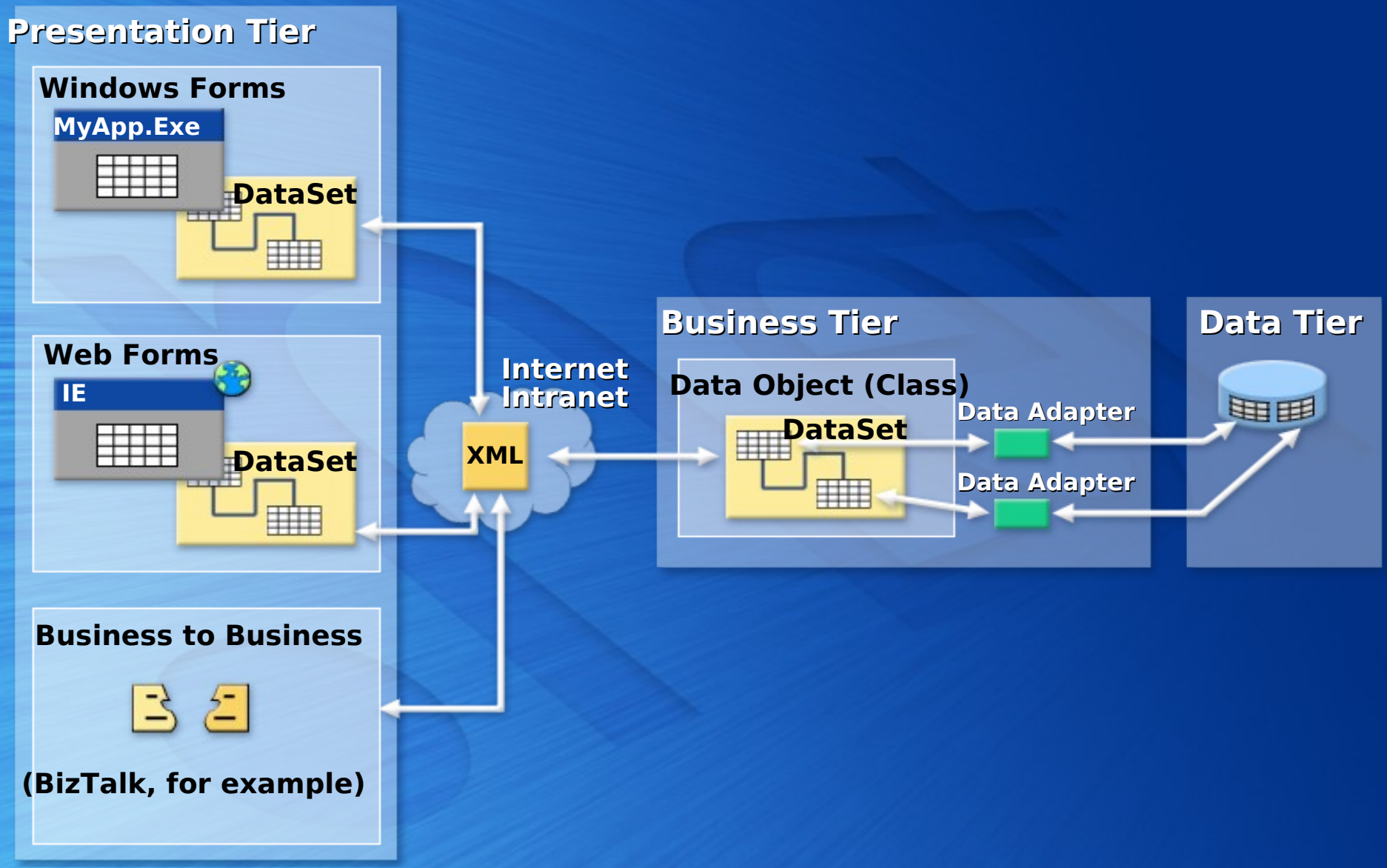
Module 05 Agenda

- Introduction
- ADO→ ADO.NET
- .NET Data Providers
- Command Object
- DataReader
- DataSet
- DataAdapter
- DataView
- Typed DataSets
- Connected vs. Disconnected Data

Introduction
ADO.NET

- Evolution of ADO
- Designed for connected and disconnected data
  - Features for integrating various types of data
  - XML in and out
- High-performance design
  - Optimized providers and Objects
- Visual Studio® .NET is designed to work with ADO.NET
  - Supports integration with objects
  - Supports wizards
- ADO.NET is closely integrated with .NET Framework
  - Exception handling, naming, notifications, etc.

Introduction
ADO.NET Architecture

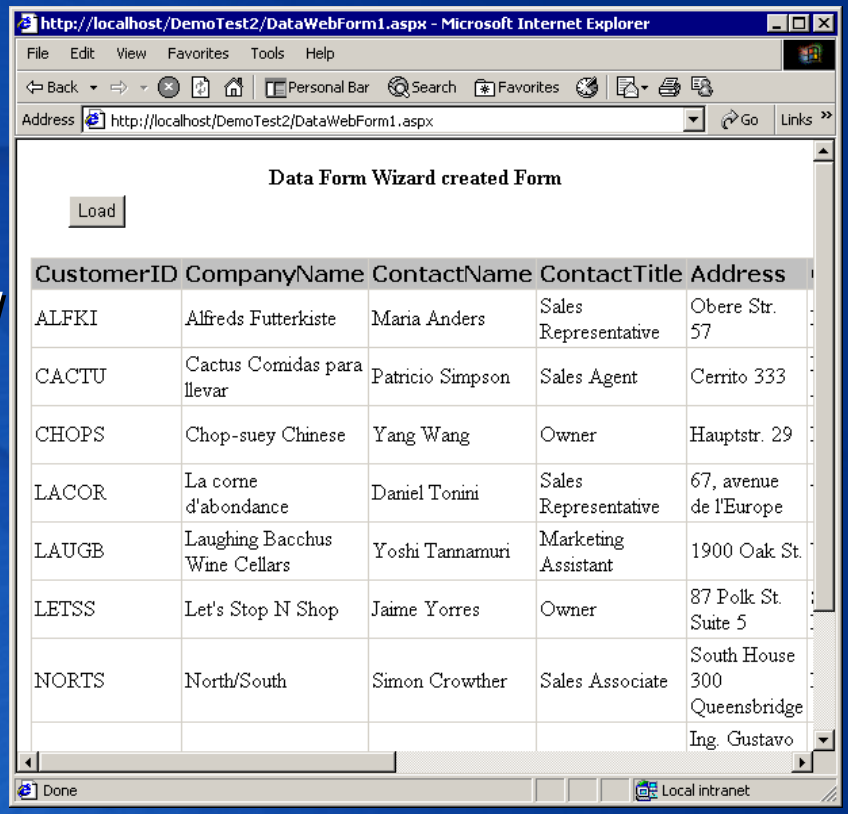


Introduction
ADO.NET Philosophy

- Data classes
  - Containers for data; know nothing about getting data from database
  - Key Object:
    - DataSet = Disconnected and in-memory cache
- Database classes
  - Used to read and write data from data sources
  - SQL Server™ and OLEDB Managed Providers
  - Key Objects:
    - Connection = Connect to data source
    - Command = Execute stored procedures
    - DataAdapter = Connects DataSet to database
    - DataReader = Forward/only, read/only (fire hose) cursor

Introduction
Ease of Use Demo

- Data Form Wizard
- Show how to use the Data Form Wizard to build new data driven form


http://localhost/DemoTest2/DataWebForm1.aspx - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Personal Bar Search Favorites
Address http://localhost/DemoTest2/DataWebForm1.aspx
Go Links
Data Form Wizard created Form
Load
CustomerID CompanyName ContactName ContactTitle Address
ALFKI Alfreds Futterkiste Maria Anders Sales Representative Obere Str. 57
CACTU Cactus Comidas para llevar Patricio Simpson Sales Agent Cerrito 333
CHOPS Chop-suey Chinese Yang Wang Owner Hauptstr. 29
LACOR La corne d'abondance Daniel Tonini Sales Representative 67, avenue de l'Europe
LAUGB Laughing Bacchus Wine Cellars Yoshi Tannamuri Marketing Assistant 1900 Oak St.
LETSS Let's Stop N Shop Jaime Yorres Owner 87 Polk St. Suite 5
NORTS North/South Simon Crowther Sales Associate South House 300 Queensbridge
Ing. Gustavo
Done
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ADO → ADO.NET

ADO evolves into ADO.NET

RecordSet	DataReader
Command	DataAdapter
Connection	DataSet
	Command
	Connection

Introduction
ADO.NET Object Model

- Design philosophy
  - DataReader
    - Forward-only and read-only RecordSets
  - DataSet
    - Disconnected and in-memory cache
  - DataAdapter
    - Connects a DataSet with a data source

.NET Managed Providers

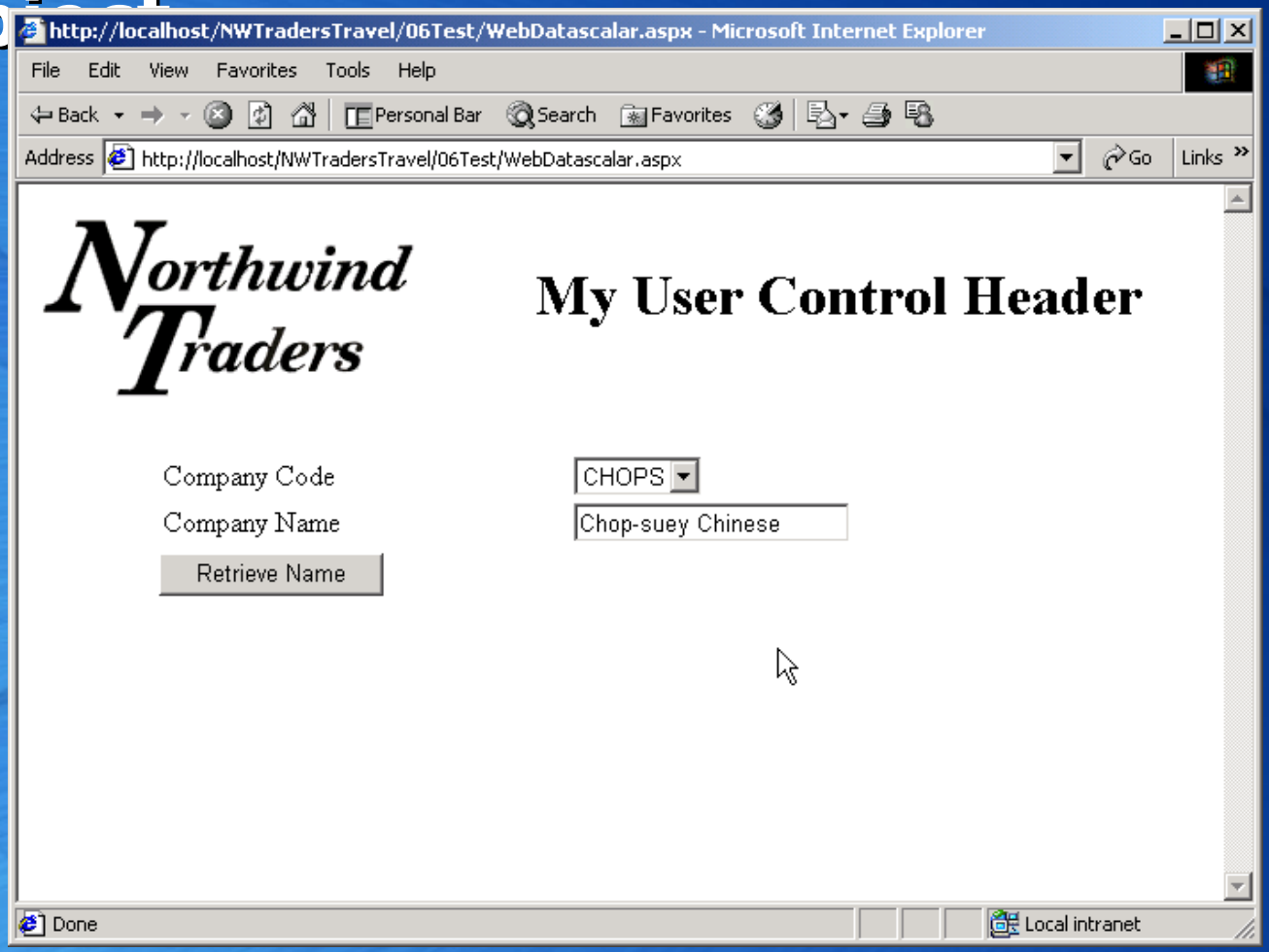
- **Manages interaction to a data source**
  - **Managed equivalent of OLEDB layer**
  - **Directly exposes consumer interfaces**
  - **Specific to (optimized for) data source**
  - **Two standard providers**
    - **System.Data.OleDb – Any data source**
    - **System.Data.SqlClient – SQL Server**

Command Object

- **SQL or OLEDB Command Object methods:**
  - **ExecuteReader**
    - **Executes a query and returns a DataReader**
  - **ExecuteNonQuery**
    - **Executes a query but returns no data**
  - **ExecuteScalar**
    - **Executes and returns a single value**

Command Object
Demo

- Show how to use the OleDbCommand object

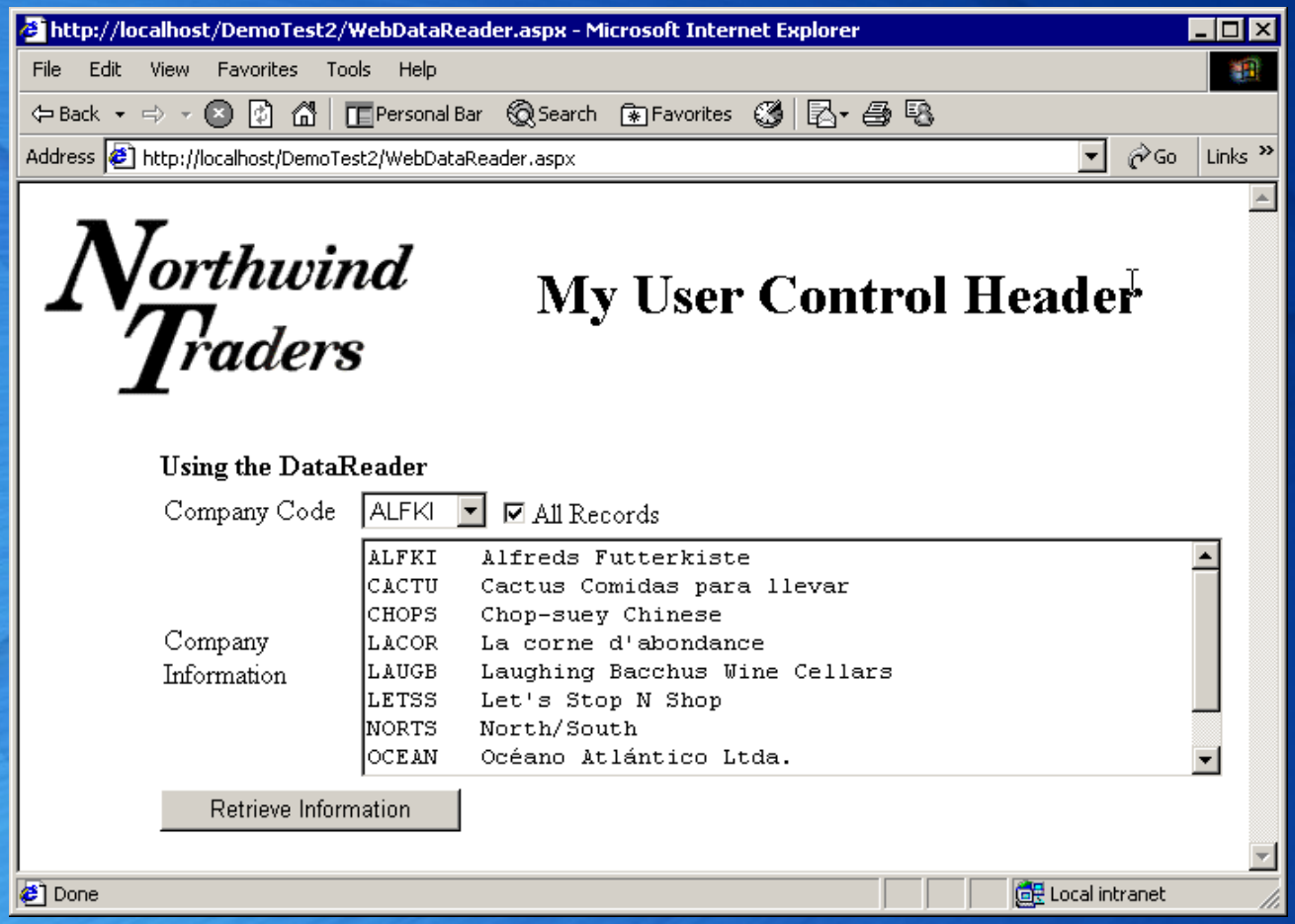


DataReader Object

- Provides forward-only and read-only streams of data
  - Represents results of an executed query or command
  - Equivalent to a Forward-Only Read-Only RecordSet
  - Does not support scrolling or updating
- Supports Databinding to Web controls

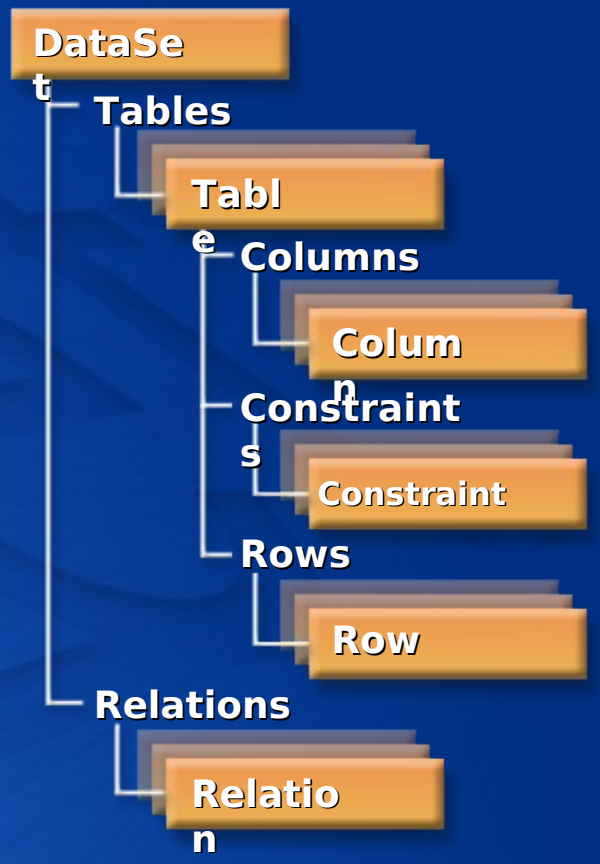
DataReader Object
Demo

- **Retrieves stream from database using DataReader**

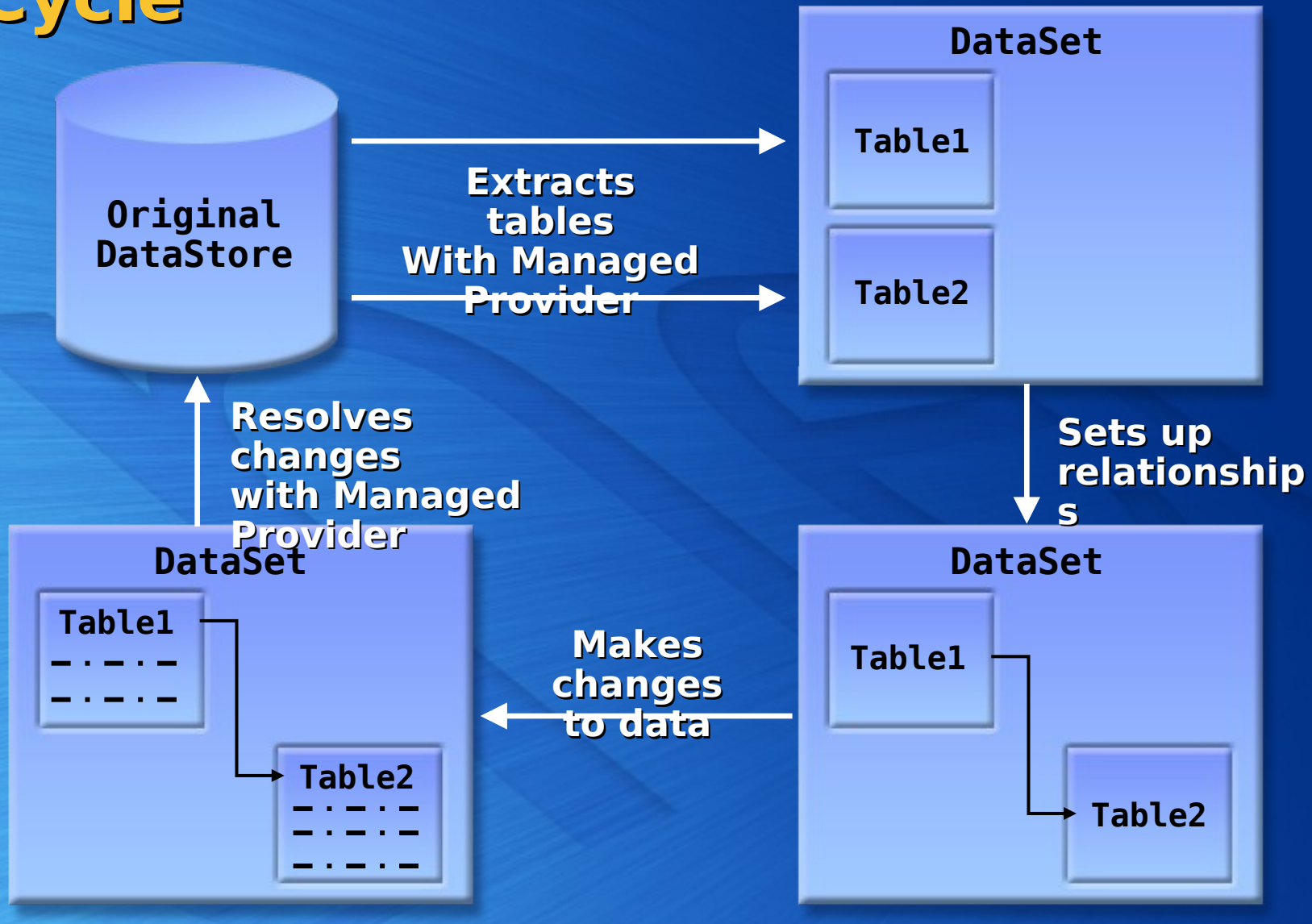


DataSet Object

- Closest equivalent of the ADO RecordSet, but richer
- Relational views of data
  - Contains tables, columns, rows, constraints, views and relations
- Disconnected model
  - Has no knowledge of data source
  - Array-like indexing
  - Strong typing
  - Supports data binding
  - Supports batch updates
  - Connects to data source via DataAdapter



Example of a DataSet Life Cycle



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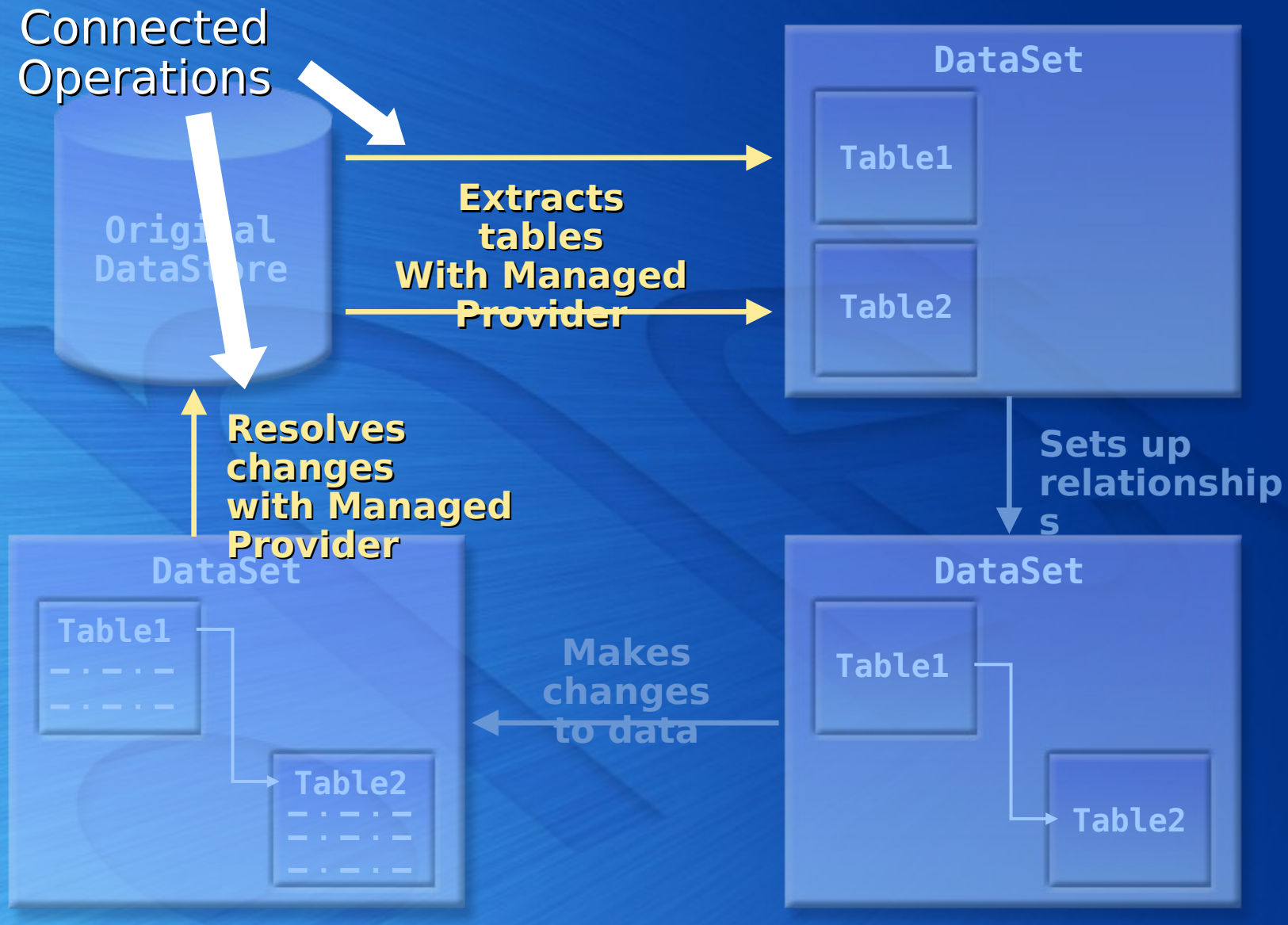

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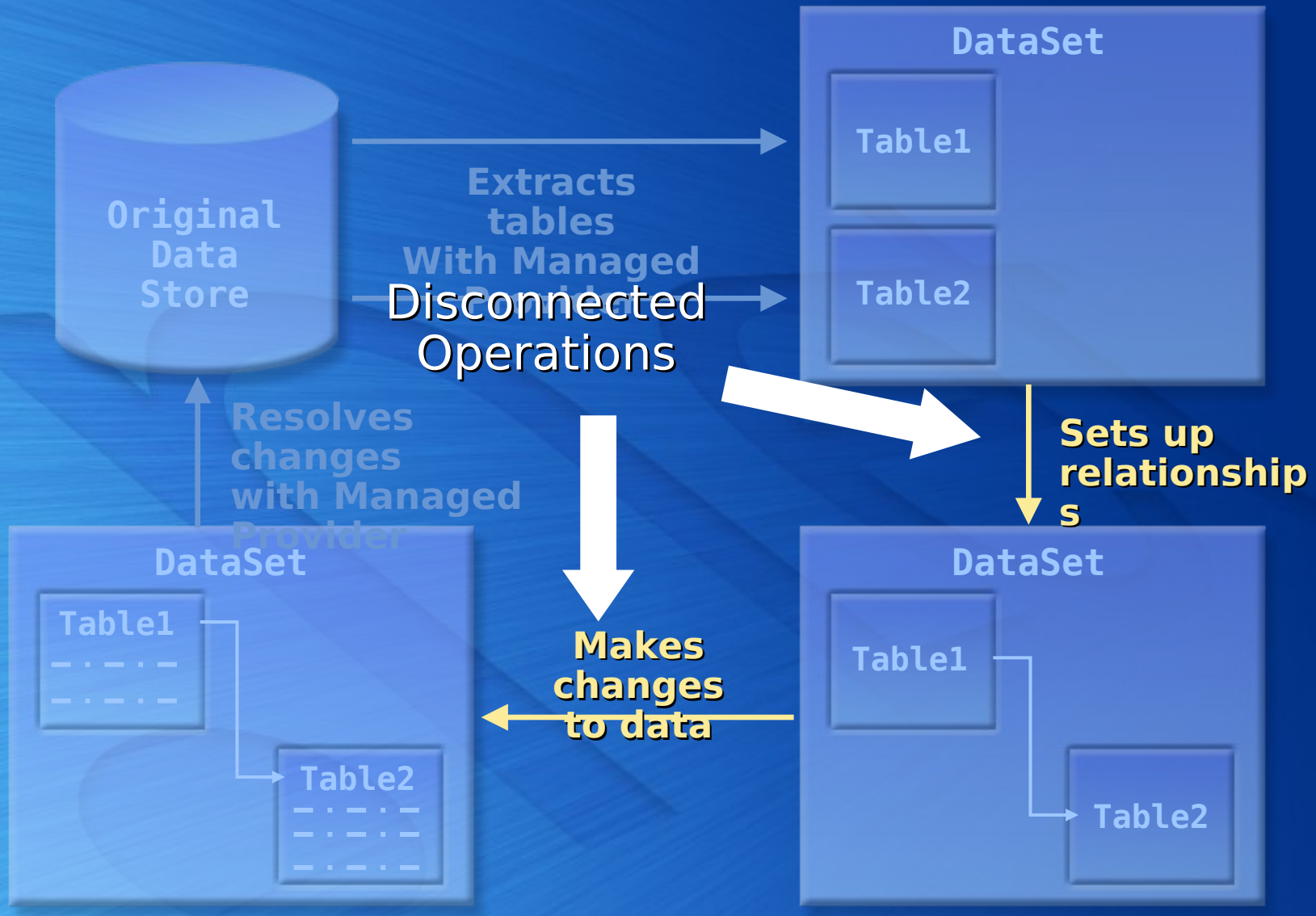
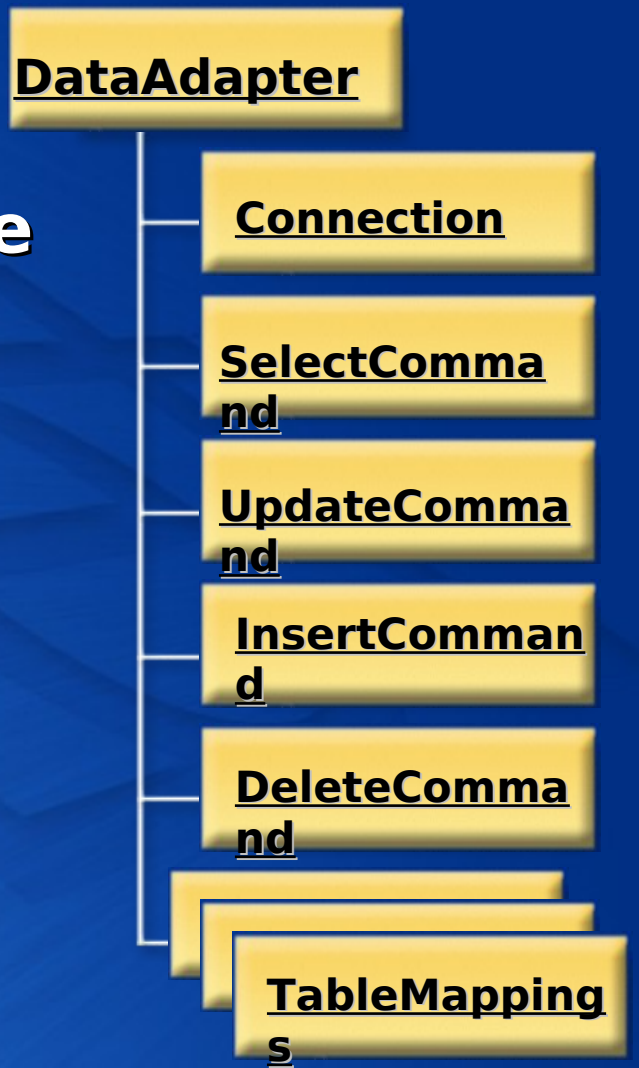


DataSet Demo

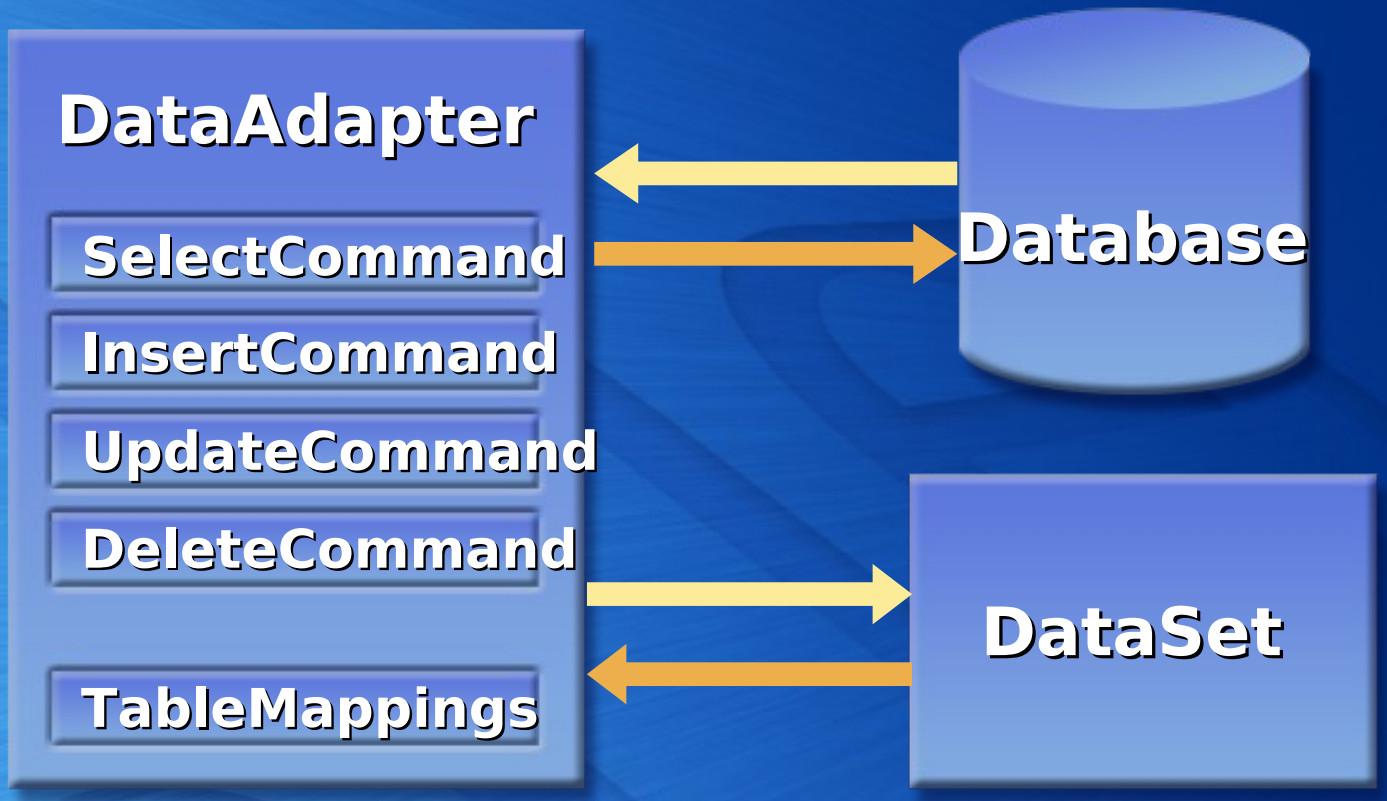
- Using the DataSet to bind to the DataGrid

DataAdapter

- Knows how to load a table from a DataStore and write changes
  - Exposes two methods:
    - Fill (DataSet and Table)
    - Update (DataSet and Table)
  - Provides mappings between tables and columns
  - Users can provide explicit insert/update/delete commands
    - Such as, specify stored procedures
  - Allows single DataSet to be populated from multiple data sources



DataAdapter

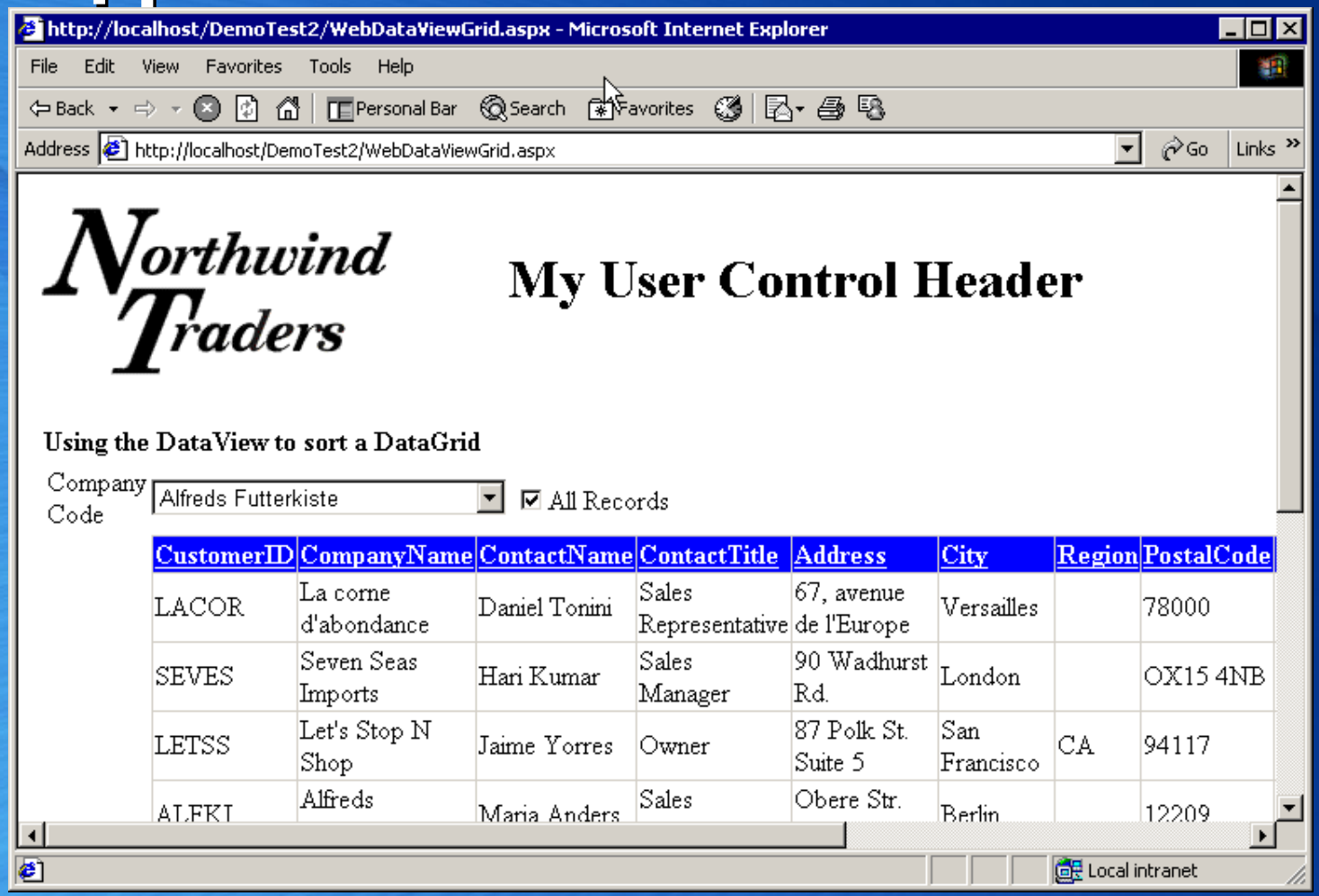


DataView

- Allows you to set a sort order and filter on a view of the Table
- A live view on a DataTable
  - Any number of DataViews can be created on a Table
    - Enables different views of the same Table
- Can be used for data binding

DataView Demo

- Using the DataView to sort a


http://localhost/DemoTest2/WebDataViewGrid.aspx - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Personal Bar Search Favorites
Address http://localhost/DemoTest2/WebDataViewGrid.aspx
Go Links
Northwind Traders
My User Control Header
Using the DataView to sort a DataGrid
Company Code
Alfreds Futterkiste
All Records
CustomerID CompanyName ContactName ContactTitle Address City Region PostalCode
LACOR La corne d'abondance Daniel Tonini Sales Representative 67, avenue de l'Europe Versailles 78000
SEVES Seven Seas Imports Hari Kumar Sales Manager 90 Wadhurst Rd. London OX15 4NB
LETSS Let's Stop N Shop Jaime Yorres Owner 87 Polk St. Suite 5 San Francisco CA 94117
ALFKI Alfreds Maria Anders Sales Obere Str. Berlin 12209
Local intranet

ADO.NET Typed DataSets

- Maps Table to DataSet properties
- Class automatically generated by the designer
- Inherits from DataSet
- Schema coded into the class
- Concise and readable code
- Compile time-type checking

ADO.NET Typed DataSets

Syntax like this (similar to ADO code):

```
Dim tableCustomer As DataTable
Dim rowCustomer As DataRow
tableCustomer = DS.Tables("Customer")
For Each rowCustomer In tableCustomer.Rows
      ListBox1.Items.Add(rowCustomer("CustomerID"))
Next
```

Can be changed to syntax like this:

```
Dim DS As CustomerDS = New CustomerDS()
dataAdapter.Fill(DS, "Customers")
Dim rowCustomer As System.Data.DataRow
Dim ctr As Integer = 0
For Each rowCustomer In DS.Customers
      ListBox1.Items.Add(DS.Customers(ctr).CustomerID)
      ctr = ctr + 1
Next
```

Connected vs. Disconnected data
When to Use What

- **Connected Data Access**
  - Transactions are required
  - No user interaction with data is necessary
  - Processes large amounts of data
- **Disconnected Data Access**
  - Use DataSet when:
    - User interaction is required
    - If memory data is required
    - Distributed applications

Summary

- ADO.NET builds on ADO
- Predictable performance
- Flexible architecture

Advanced Topics
Data Access and XML

- XML is the underlying data format
  - Serialization to XML
- Accessing relational data as XML
- Accessing XML data as relational
- XML schemas and data access
- XML is the underlying data representation in .NET

Advanced Topics
Data Access and XML

- Relational and XML: The best of both worlds
  - Use ADO.NET for data access
  - Convert to XML document with proper structure and pass between tiers
- Use XSD to formally specify structure of data passed between tiers
- Easily expose your data to the world
  - As XML - Platform independent
  - Use XSD schema as the contract
  - Easily get data in desired structure: Load schema into a DataSet, the data

Resources

- ***ADO.NET Page* - A good starting place**
  http://msdn.microsoft.com/vstudio/nextgen/Technology/adoplus.asp
- ***ADO.NET Managed Providers* - Short description of ADO providers**
  http://msdn.microsoft.com/library/dotnet/cpguide/cpconadonetmanagedproviders.htm
- ***ASP Data access* -**

  http://msdn.microsoft.com/library/dotnet/cpguide/cpconaspdataaccess.htm

Resources

- ***Data Grid Server Control* - A page of links that refer to how to best utilize data grid controls in ASP.NET applications**
  http://msdn.microsoft.com/library/dotnet/cpguide/cpcondatagridaspnetservercontrol.htm
- **A *Comparison of ADO and ADO.NET* - Article comparing ADO and ADO.NET**
  http://msdn.microsoft.com/library/dotnet/cpguide/cpconcomparisonbetweenadoado.htm

In-Depth Training On .NET Data Access

Direct from Microsoft

- **2389A: Programming with ADO.NET**

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